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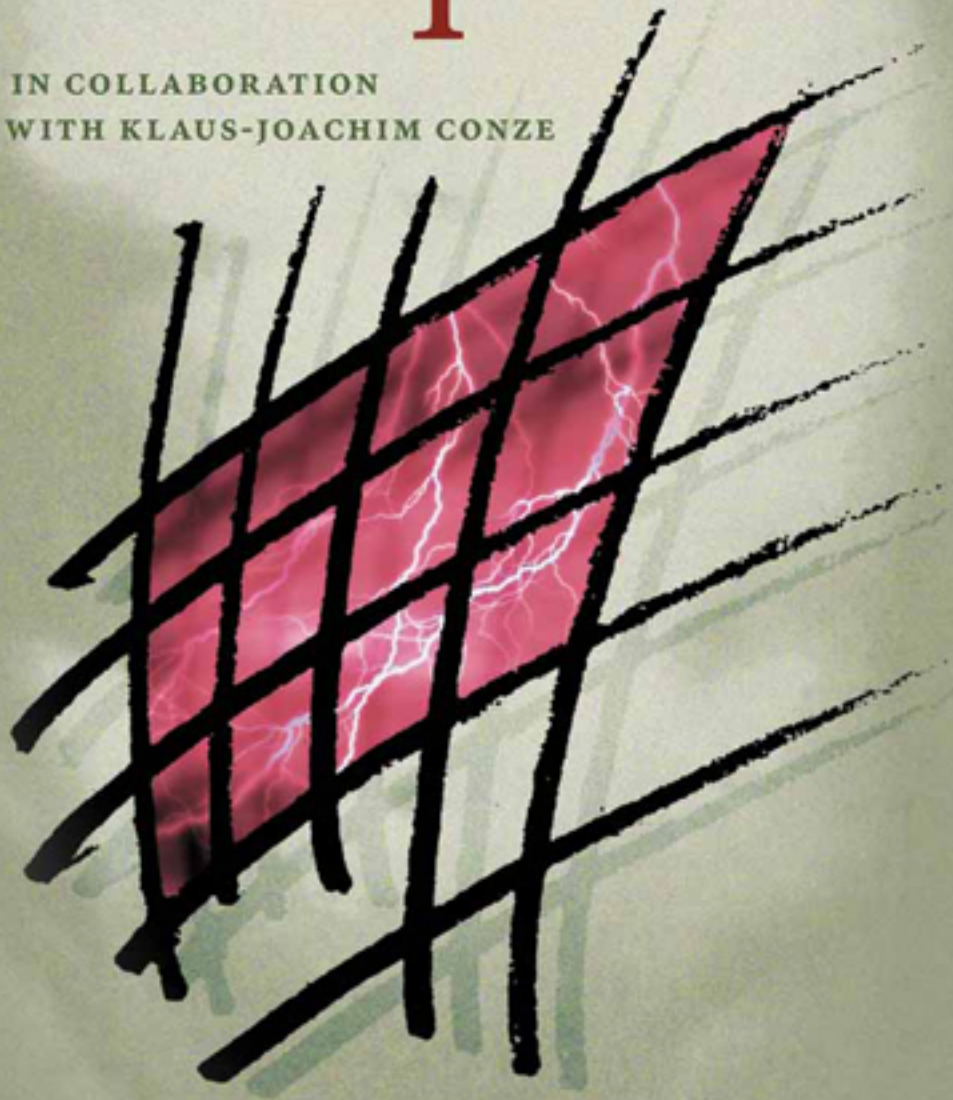
ROBERT J. FITZGIBBONS
EDITORS

Hernia Repair Sequelae

IN COLLABORATION
WITH KLAUS-JOACHIM CONZE



Springer

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In Collaboration with Joachim Conze

With 236 Figures and 97 Tables

Springer

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ISBN 978-3-642-04552-3 Springer-Verlag Berlin Heidelberg New York

Bibliografische Information der Deutschen Bibliothek
The Deutsche Bibliothek lists this publication in Deutsche Nationalbibliographie;
detailed bibliographic data is available in the internet at http://dnb.ddb.de.

Springer Medizin
Springer-Verlag GmbH
ein Unternehmen von Springer Science+Business Media

springer.de

Planning: Hanna Hensler-Fritton, Heidelberg
Projectmanagement: Ulrike Dächert, Heidelberg
Design and Cover: deblik Berlin
Cover Image: friesischAdvertising GmbH
Typesetting: TypoStudio Tobias Schaedla, Heidelberg

SPIN: 12765003

Printed on acid free paper 5135 – 5 4 3 2 1 0

Preface

At the last Suvretta meeting in 2006 on recurrent hernia prevention and treatment, we demonstrated that with the wide range of available techniques, materials, and meshes at our disposal today, an experienced hernia surgeon will be able to prevent or at least treat a recurrent hernia.

But whereas recurrences can be treated successfully in most cases, some other hernia repair sequelae can result in severe, sometimes untreatable problems, e.g. pain, infection, adhesion, or infertility. That was the reason to focus the 5th Suvretta meeting in 2008 on hernia repair sequelae. We are convinced that such sequelae can be a more serious problem for the patient than the mostly treatable recurrent hernia. Therefore, it was appropriate to focus the 5th Suvretta meeting on these longterm problems.

During a four-day meeting, we discussed all technical aspects of the various operations and materials to generate a consensus concerning the best techniques and meshes. We explored methods to improve surgical techniques to look into the multifactorial causes of post hernia repair sequelae. In the seclusion of the Swiss plateau valley we had a perfect setting to discuss these important hernia repair problems in detail with the top hernia specialists in the world.

With this book, the results of this exceptional 5th Suvretta meeting have been made accessible for every surgeon who is interested in hernia surgery and its sequelae.

V. Schumpelick

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I Risk for the Spermatic Cord

Are There Adverse Effects of Herniorrhaphy Techniques on Testicular Perfusion?

O. N. Dilek

1

Introduction

The spermatic cord anatomy has been well studied because of its important role in testicular physiology and surgery. The spermatic cord is composed of the vas deferens; testicular vessels, including the testicular artery and veins; autonomous nerves; spermatic muscle; and fascia [1]. Each of these structures can have various effects on testicular perfusion.

The testicular arteries arise from the abdominal aorta just below the renal artery and travel in the intermediate stratum of the retroperitoneum to reach the internal inguinal ring and become a component of the spermatic cord [1]. In an intraoperative dissection study of over 100 spermatic cords, Beck et al. identified a single internal spermatic artery in 50% of cases, with two arteries in 30% of spermatic cords and three arteries in 20% [1]. At the internal ring, the vessels are joined by the genital branch of the genitofemoral nerve, the ilioinguinal nerve, the cremasteric artery, the vas deferens, and its artery. The testicular artery branches into an internal artery and an inferior testicular artery and into a capital artery to the head of the epididymis [1]. Human testicular parenchyma receives approximately 9 ml of blood per 100 g of tissue per minute. Silber showed that an interruption of the testicular blood supply may result in testicular atrophy [2].

The spermatic veins (testicular veins) collect the blood from the testis, epididymis, and scrotum. The testicular veins form several highly anastomotic channels that surround the testicular artery as the pampiniform plexus. This arrangement allows countercurrent heat exchange, which cools the blood in the testicular artery [1]. The vascular arrangement in the pampiniform plexus–with the counterflowing artery and veins separated only by the thickness of their vascular wall in some areas–facilitates the exchange of heat and small molecules. For example, testosterone is transported from the vein to the artery via a concentration-limited passive diffusion process. The countercurrent exchange of heat in the spermatic cord provides blood to the testis, which is a specialized structure that functions optimally at 2–4°C lower than the rectal temperatures in normal men [3, 4]. A loss of the temperature differential is associated with testicular dysfunction [1, 3]. At the level of the inguinal canal, the vein joins to form two or three channels and then a single vein that drains into the inferior vena cava on the right and the renal vein on the left [1, 5].

The cremasteric muscle is one of the parts of the spermatic cord. When this muscle contracts, the cord is shortened, and the testicle is moved closer up toward the body, a position that provides slightly more warmth to maintain optimal testicular temperature. When cooling is required, the cremasteric muscle relaxes, and the testicle is lowered away from the warm body and is able to cool. This phenomenon is known as the cremasteric reflex [6]. The dartos muscle is a sympathetically innervated dermal muscle layer within the scrotum, distinct from the somatically innervated cremasteric muscle. Abnormalities of dartos and cremasteric muscle innervation may impact testis thermoregulation and spermatogenesis [6].

Autonomous nerves reach the testis accompanying the testicular artery and pampiniform plexus. The vast majority of testicular nerves are sympathetic axons with vasomotor function. They innervate the small vessels supplying clusters of Leydig cells and regulate testicular luteinizing hormone receptors and blood flow [7, 8].

About 10% of people develop some type of hernia during their lifetime, and more than 750,000 hernia operations are performed in the United States each year. Hernias are seven times more common in males than in females [9]. Abramson et al. reported that the overall current risk for a male to have an inguinal hernia is 18%, and the lifetime risk is 24% [10].

Anatomically, a close relation exists between the spermatic cord and inguinal hernias. Inguinal hernias can carry the risk of ischemia of the testis by intermittent mechanical compression (pressure) on the testicular vessels [11, 12]. In some reports, color Doppler ultrasonography showed that, preoperatively, the sonographic resistive index (RI) was significantly elevated in the affected (hernia) side compared with the normal side [13]. On the other hand, Muñoz Sánchez et al. concluded that uncomplicated inguinal hernias cause no significant alterations in the arterial circulation of the testicle [14].